SOUTH CAROLINA SEA GRANT CONSORTIUM

2003

Plan of Work

September 1, 2003

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PROGRAM MANAGEMENT, ADMINISTRATION, AND LEADERSHIP

Goal 1: Maintain and enhance a management system and engaged administrative staff which supports the programmatic goals of the research, education and extension programs of the SCSGC.

1.1. Maintain the Consortium's extramural (non-state) funding at 2002 levels. (DeVoe)

1.2. Recruit and hire a qualified individual to fill the vacant position of Assistant Director for Program Development. (DeVoe)

1.3. Recruit and hire a qualified individual to fill the vacant position of Grants Assistant for Program Management (Knight)

1.4. Encourage Consortium and Extension staff to pursue leadership positions with pertinent organizations and associations at the state, regional, and national levels. (DeVoe, Knight, Bacon, Blackwell)

1.5. Process proposals to assure grant awards are received in a timely manner, reviews, signs and returns official documents to granting agencies and issues sub awards to research institutions. (Knight)

1.6. Handle extension requests of sub-awards as soon as received to allow for a fluid continuation of research, extension, and communication project and program objectives. (Knight)

1.7. Assure SCSGC accounting procedures and equipment inventories are current and meet or exceed state, federal, and local policies and regulations. (Knight)

1.8. Ensure that the Consortium's accounting and administrative procedures meet or exceed the requirements of the state's single agency audit for FY02. (Knight)

1.9. Maintain communications with SCSGC liaisons at colleges and universities to process and administer grant sub-award documents in a timely manner. (Knight)

1.10. Foster professional development goals of the administrative staff through attendance at workshops, seminars and other meetings to enhance their knowledge of practices and procedures of federal, state, and local governments. (Knight)

1.11. During 2001-2002, the Consortium's Management Information System (CMIS) was converted from an outdated database system running on Unisys equipment and a text-oriented database software package called TXBASE 2.0, to a Windows-based platform utilizing Microsoft Access as its database. CMIS addresses one of the Consortium's major management objectives – the evaluation of organizational performance against goals and standards. Ultimately, this will permit the Consortium's Management Information System to become more fully Web-based and interactive with Sea Grant researchers and other stakeholders. In the immediate future, the new Access database will be further refined to facilitate querying as well as generating useful management reports. (Dwyer)

1.12. Enter, within 30 days of receipt, annual and final project reports into the CMIS database as edited. (Dunmeyer)

1.13. To reflect significant changes in recent years in the way we do business, the S.C. Sea Grant Consortium's "External Procedures Guide" will be significantly revised and then distributed to appropriate constituencies early in 1st Q 2003. (Dwyer, Knight)

1.14. To reflect significant changes in Consortium internal procedures in recent years, the S.C. Sea Grant Consortium's "Internal (staff) Procedures Guide" will be significantly revised and distributed to staff 4th Q 2003. (Knight, Dwyer)

1.15. Continue to update the Consortium's Web site to further facilitate the agency's goal to make the proposal solicitation and review process with our member institutions more Web-based. (Dwyer)

1.16. In the spring 2003, the biennial "Omnibus" request for proposals will be issued, reflecting the strategic goals, objectives, and research and education priorities that will be determined by the strategic planning process occurring during the fall and winter of 2002-2003. The Consortium's RFP is designed to solicit those research proposals most closely aligned with our strategic plan. Our goal is to generate 50 concept letters. (Dwyer)

1.17. Conduct at least two site visits in 2003 to monitor investigator process as well as advance the agency's knowledge and understanding of the research projects we support and may fund in the future. This process also allows us to stay current with research issues and advances in technologies, which address management of South Carolina's coastal resources. (Dwyer, Blackwell)

1.18. Coordinate the program management, planning and reporting processes among the partner institutions of the SCSGEP, including CES and other Consortium members. (Bacon)

1.19. Maintain and rebuild SCSGEP specialist staffing levels. (Bacon)

1.19.1. Fill the vacancy in the Coastal Recreation and Tourism sub-program.
1.19.2. Fill the vacancy in the Coastal Hazards sub-program.
1.19.3. Establish and fill a SCSGEP Fisheries Extension Specialist position.

1.20. Represent the SCSGEP in national and regional Sea Grant Extension network activities. (Bacon)

1.21. Design, program, and maintain the Consortium's Web site. (Snow)

1.21.1. Update SCSGC Web site twelve times yearly.
1.21.2. Produce SCSCG Web reports twelve times yearly.
1.21.3. Chairs agency Web core group meetings twelve times yearly.
1.21.4. Stay abreast of new technologies by completing two training courses.
1.21.5. Maintain membership in two Web-related professional organizations.
1.21.6. Attend four Web-related meetings or workshops.

1.22. Design and produce graphic materials for the Consortium. (Snow, Blackwell)

1.22.1. Design and produce 45 Consortium publications.
1.22.2. Design and produce two specialty items for events such as Beach Sweep/River Sweep and Conferences.
1.22.3. Design and produce two display items such as award plaques and updated panels on Consortium displays.
1.22.4. Design three new graphic identities such as logos, banners, and graphic elements for Consortium-related materials.

1.23. Begin preparing and planning for the Consortium's 2004 Program Assessment Team review. (DeVoe, Knight, Bacon, Dwyer, Blackwell, and staff)

1.24. Respond to unanticipated, priority projects and needs, when appropriate. (DeVoe, Knight, Dwyer, Bacon, Blackwell)

COASTAL OCEAN PROCESSES AND DYNAMICS

Goal 2: Identify and understand the processes dominating the coastal ocean of the South Atlantic Bight as they affect coastal processes, pollution of the coastal zone, fisheries dynamics, and mineral resources management, and are influenced by global climate change.

2.1. Coastal erosion is a significant issue affecting the economies of coastal communities in South Carolina. The overall goal of the South Carolina/Georgia Coastal Erosion Study is to enable planners to determine sediment budgets for defined sections of coastline using predictive models based upon the composite efforts of the various components of the study. The investigative strategy will quantify historical shoreline changes and identify critical erosion areas; determine geologic frameworks; and calculate sediment volumes and transport rates within areas of principal concern. The present phase of the study has been expanded to include remaining portions of the South Carolina coast and portions of the Georgia coastline. (DeVoe et al: R/GS-2)

2.1.1. Provide useful, accurate, well-documented digital data sets to principal investigators in the coastal erosion study and the general public. Shoreline and coastal profile data will be synthesized into a common, programmatically defined Geographic Information System. (Harris and Wright)

2.1.2. Determine the alongshore stratigraphy and examine the timing of spit development of the North Island barrier complex. (Wright *et al.*)

2.1.3. Define the distribution and character of near-surface geologic strata at the active coast and develop a bibliography of references related to the geology of the Grand Strand region of South Carolina's coast. (Harris and Katuna)

2.1.4. Elucidate the roles inner-shelf morphology and geologic framework have on the evolution of the northern South Carolina coast, as well improve understanding of mobile sediments in order to determine sediment budgets for realistic long-term beach renourishment plans for the state's shoreline. Will also assist state's mapping efforts for important biological hard-bottom habitats. (Gayes *et al.*)

2.1.5. Identify the effect of tidal and wind forcing in the circulation patterns of the intercontinental shelf as well as changes in wave propagation as a function of depth, strength of current, and current direction. (Voulgaris and Work)

2.1.6. Develop an integrated GIS-based approach to quantifying rates of shoreline change and relevant geologic controls of change in the Georgia Bight. (Alexander *et al.*)

2.2. There is a need to identify and understand the processes dominating the coastal ocean of the South Atlantic Bight (SAB). To address this need, the issue of beach nourishment, which is presently the primary erosion mitigation strategy in South Carolina and many other states, will be studied. A wave transformation model (SWAN) will be used to identify and characterize nearshore nourishment materials. The objectives are to determine: (1) nearshore impacts of dredging a previously identified sand source offshore of Folly Beach, SC; (2) the significance

of wave-current interaction when making this assessment; and (3) the optimum borrow pit configuration. (Work: R/CE-5) - [Project ended in February 2002; included to report any additional project results.]

2.3. The relationship between an offshore shoal in the Myrtle Beach area and coastal erosion dynamics will be examined. The end goal is to characterize and quantify the potential for the shoal to be a sustainable borrow site for this economically important resort community. Specific objectives are to: (1) identify the effect of tidal and wind forcing around the shoal; (2) identify the effect of the shoal in controlling wave propagation and its role in "energetic events" (such as storms); (3) model the propagation of gravity waves for the prediction of wave characteristics; and (4) model coastal circulation over the shoal. (Voulgaris: R/CP-11)

2.4. Develop and distribute one press release or one information product in conjunction with coastal ocean processes and dynamics activities. (Ferris)

2.5. Develop and distribute one press release or one information product for the South Carolina/Georgia Coastal Erosion Study. (Ferris)

2.6. Work with principal investigators Paul Work and George Voulgaris on the final results of project R/CE-5, *(Nearshore impacts of offshore dredging for beach nourishment)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site; a link will be established to their Web page. (Tibbetts)

2.7. Work with principal investigator George Voulgaris on project R/CP-11, *(Towards quantifying coastal erosion in S.C.: Offshore shoals as sediment sinks and controls for shoreline change)*. The Project will be briefly described in the research section of S.C. Sea Grant's Web site; one news or feature article will be written and sent to appropriate outlets on the results when the project is completed; we will assist with announcements and publications for Sea Grant Extension organized workshops. (Tibbetts)

2.8. In partnership with the NOAA Coastal Services Center, the College of Charleston, and other institutions, develop and implement tasks and projects identified through the Southeastern Coastal Ocean Science conference and workshop, held in January 2003. (DeVoe, Sheldon, Blackwell, external partners)

COASTAL ECOSYSTEM HEALTH AND SAFETY

Goal 3: Enhance the availability and quality of marine, estuarine, and freshwater resources that can support the economic and quality-of-life needs of South Carolina's public and private sectors.

3.1. Tools that identify individuals and populations experiencing chronic stress can provide means to detect early warning signs of ecosystem stress. Mitigation efforts may then be employed in a timely manner to prevent severe effects at the population and ecosystem levels. Means will be developed to test and validate promising cellular biomarkers. The objectives are to: (1) validate potentially valuable biomarker responses of anthropogenic perturbations on the health of two common estuarine bivalve species, the oyster, *Crassostrea virginica,* and marsh mussel, *Geukensia demissa*; (2) determine the effects of pollutant stress on reproductive potential and recruitment; and (3) identify linkages between cellular biomarker responses and parameters that are related to population success. (Ringwood: R/ER-19) - [Project ended in February 2002; included to report any additional project results.]

3.2. Ecosystem dynamics along the Cooper River, South Carolina, will be studied by refining a model of succession of tidal freshwater wetlands on the river. The modeling effort will use data and successful modeling work from previous and ongoing studies. A better understanding of the ecological and human use values of the different habitats will provide the foundation for a holistic management plan of these wetlands. The focus of the study will be the roughly 2500 hectares of impoundments that were former rice fields, which are changing rapidly due to human intervention, such as the re-diversion of the Cooper River. The re-diversion project dramatically increased the pace of succession in these valuable wetlands. (Morris, *et al*: R/ER-20)

3.3. The copepod *Amphiascus tenuiremis* will be studied as an estuarine model for work aimed at understanding the potential risk of a new pesticide. Genome-based technology, including PCR, will be used to look for genes associated with pesticide resistance in order to develop a monitoring tool for a newly approved and highly toxic pesticide, fipronil. This pesticide is being used in areas adjacent to estuarine systems in South Carolina, such as golf courses. Genetic crosses will be made to test for heritability of resistance in the copepod. PCR methods developed from individuals will be used to screen wild populations as well as laboratory stock. (Staton: R/ER-21)

3.4. Exposure-toxicity risk assessment tools will be developed based on the bioaccumulation of heavy metals in the benthic foraminiferan *Ammonia becarii* and concordant toxic response of the common benthic copepod, *Amphiascus tenuiremis*. The goal is to develop a linked-species model that relates bioaccumulation to exposure risk. The model will provide an index of exposure-impact that is calibrated to metal uptake. Ultimately, information gathered from

contaminated sites can be used by managers to better determine appropriate limits and approaches to site clean-up. This information is economically valuable for its potential to reduce site clean-up costs, which tend to be high in estuarine settings. (Shaw: R/ER-22)

3.5. Serious decline in coastal water quality and ecosystem health results from coastal development. Along with development comes an increase of anthropogenic wastes, leading to eutrophication and resulting ecological damage, such as fish kills and harmful algal blooms. The flux and chemical signature of groundwater, and impacts on various biological processes in tidal creek waters, will be quantified to understand the causes of damage and document ecosystem response to development. (Moore: R/ER-23)

3.6. Prepare and submit a proposal to the Centers for Disease Control and Prevention in response to its RFP seeking to continue and enhance the capabilities of selected states to understand and monitor *Pfiesteria* and other harmful algal blooms as they may affect public and environmental health, and, if funded, implement the program. (DeVoe, Knight, Ferris, external partners)

3.7. Conduct NEMO workshops for elected and appointed officials within communities in three SCDHEC "priority" watersheds in SC. (Sawyer, Turner)

3.8. Establish interagency/organizational partnerships to fund and conduct NEMO activities. (Sawyer)

3.9. Work with the National NEMO leadership in the development of the national NEMO network. (Sawyer, Turner)

3.10. Plan, organize and conduct regional water quality education training workshops for area Sea Grant and Cooperative Extension agents. Training sessions will be targeted towards agents from North Carolina, South Carolina and Georgia. (Sawyer)

3.11. Develop and implement a program (South Carolina Clear Water Contractor) which brings sediment and erosion control information and education to those persons who have the most direct influence on sediment and soil erosion impact reduction: general contractors, paving and grading contractors, bulldozer operators, excavators and all others involved in land disturbance. (Sawyer)

3.12. Continue to organize, chair and coordinate the development of Continuing Certification Hours for Aquatic Pesticide Applicators Workshop/SCAPMS. (Whetstone)

3.13. Complete work on an Integrated Pest Management study evaluating the effectiveness of stocking of tilapia to control filamentous algae in farm ponds, horticultural gardens, golf course irrigation ponds, etc. (Whetstone)

3.14. Continue work with the US Fish and Wildlife Service on the control of aquatic vegetation and the development of a management plan for aquatic weed control at a wood stork nesting site in South Carolina. (Whetstone)

3.15. Continue to work with International Paper, other industrial and municipal water users, SCDHEC and the US Army Corps of Engineers to employ integrated pest management (IPM) and the use of harvesters, biological control and herbicides to maintain surface water canals. (Whetstone)

3.16. Serve as members of the selection committee for the South Carolina Environmental Awareness Awards state-wide competition. (Blackwell, Knight)

3.17. Serve as communications officer of the S.C. Task Group on Harmful Algae. (Ferris)

3.17.1. React to any HAB events by writing and distributing press releases and assisting with press conferences, if scheduled.
3.17.2. Develop and distribute one publication.
3.17.3. Attend Task Group meetings and workshops.
3.17.4. Expand *The S.C. Task Group on Harmful Algae* newsletter and publish it three times. (Ferris, Blackwell)
3.17.5. Edit and maintain the S.C. Task Group on Harmful Algae Web site. The site will be updated three times yearly. (Ferris, Snow)

3.18. Support Sea Grant Extension environmental quality specialist by assisting with one workshop announcement and one press release for Non-point Education for Municipal Officials (NEMO). (Blackwell, Ferris)

Goal 4: Examine the forces of climate and hazards, and to provide information to the public and private sectors on the nature of hazards and how to plan for them.

4.1. The Climate and Hazards program area focuses on efforts to develop tools and techniques to avoid and mitigate the effects of coastal natural hazards, such as high winds. The goal is to provide technical and educational programs that examine the forces of climate and hazards and provide information to the public. Technologies will be deployed for monitoring wind loads, to (1) characterize the wind structure in hurricanes and the associated wind loading of buildings in regions of strong convection; (2) evaluate performance of retrofit technologies in reducing hurricane wind damage and losses; and (3) determine how well conventional boundary layer wind tunnel model studies reproduce wind loads generated by convective winds and hurricanes. The research is significant in that wind loads on low rise buildings (such as residential homes) in the convective eyewall regions of a major hurricane have never been measured, although recent Doppler Radar research indicates complex wind structures exist. Understanding them will improve the ability of government and industry to establish cost effective mitigation measures. (Reinhold: R/CE-6)

4.2. Conduct 113 Calhoun St. house tours and demonstrations of hazard mitigation tools and techniques. (Bacon)

4.3. Work with the National Severe Storms Laboratory, National Weather Service and North Carolina Sea Grant on the extension elements of a pilot project to test a new Doppler radar-based, multi-sensor approach to improved flash flood warnings in the Tar River basin in NC. (Bacon).

4.4. Coordinate the activities of the national Sea Grant Hazards Theme Team. (DeVoe, Bacon)

4.5. Participate on the SEA-COOS (South Eastern Atlantic – Coastal Ocean Observing System) program to help ensure observational data collected is useful in a variety of coastal management and economic settings. (DeVoe, Bacon)

4.5.1. Serve as co-PIs on the SEA-COOS program representing South Carolina interests. (Bacon, DeVoe)

4.5.2. Serve as a member of the Board of Directors of SEA-COOS. (DeVoe)

4.6. Keep the public informed about coastal hazards by distributing 100 hurricane preparation checklists and other hazard-related information. (Blackwell)

4.7. Keep the public informed about coastal hazards by distributing two press releases concerning hurricane safety and what types of literature is available at the Consortium. (Ferris)

4.8. Include Web links to Sea Grant HazNet, which is a collaborative effort of the Sea Grant network programs in hazard mitigation. This Web site has a wide range of Sea Grant and other information on it including Sea Grant hazards, research reports, hazards fact sheets, K-12 hazards education materials, and links to other hazards related sites. (Snow)

4.9. Serve as chair of the public relations committee for the 113 Calhoun project, offer assistance with print products such as a self-guided tour booklet and signs for the 113 Calhoun exhibits. (Blackwell)

4.10. Assist the Sea Grant Extension coastal hazards specialist with one technical bulletin geared towards homeowners and builders that describe building techniques and materials for hazard loss reduction. (Blackwell)

4.11. Collaborate with the Sea Grant Extension coastal hazards specialist to develop supporting materials for one homeowner hazards workshop. (Blackwell)

4.12. Serve as a member of the National Hazards Theme Team and produce one hazards publication. (Blackwell)

4.13. Work with principal investigator Timothy Reinhold on project R/CE-5*, (Determination of hurricane wind loads and wind events)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site; one press release will be written to announce the start of the project; one news or feature article will be written and sent to appropriate outlets on the results of the project. (Tibbetts)

ECONOMIC LEADERSHIP

Goal 5: Develop techniques, technologies, and new products based on marine systems for use in commercial and industrial applications, and to continue to apply low-cost technologies to coastal and marine resource problems.

5.1. The development of a molecular genetic characterization of the haloorganic degradation activity of cordgrass, *Spartina alterniflora*, and the isolation of the corresponding gene, will pave the way for the generation of super-dehalogenerator plants by conventional breeding and gene transfer. The plant will then be used for new remediation technologies. Such a genetically engineered plant may play a significant role in the remediation of pollutants in estuarine and marsh habitats. These improved transgenic organisms are targeted for use in soil or water bioremediation in sites contaminated with halogenated organics. (Marton: R/MT-4)

5.2. Advances in population genetics technologies will be used with the inland silverside fish, an estuarine "sentinel species," to measure population genetic responses to contaminant history across select sites with various qualitative and quantitative levels of contamination. Theoretical and empirical population genetics are being used to determine chronic and subtle effects of pollutants on marine and estuarine resources resulting from anthropogenic activities. One product will be genetic assays to identify exposure levels of contaminants of concern in South Carolina. (Quattro: R/MT-5)

5.3. In a first-of-its-kind, cDNA micro-arrays will be used as a tool for analyzing environmental stressors and disease. The research will apply this new technology to local populations of the commercially important species of white shrimp, *Litopenaeus setiferus*, which is also a keystone species in South Carolina estuarine systems. Two key objectives of the project are to: (1) collect and analyze functional genomic data to understand their physiological interaction with the environment using bioinformatic-based approaches and (2) train new researchers, particularly graduate students, in the new and emerging technologies associated with "eco-genomics." (Gross: R/MT-6)

5.4. The Comparative Institute for Fisheries Molecular Biology (FISHTEC) research project will enhance our knowledge about the population biology of commercially important pelagic fish species, such as tunas and swordfish. Additional species will be added to the project for study, such as southern flounder, croaker and scup. One initiative will focus on species in "evolutionary significant areas." Future initiatives will be integrated with the genomics work that will be done in the new Hollings Marine Lab at Fort Johnson, Charleston, S.C. Recent advances in genomics, molecular biology, and population genetic theory will be used to identify the potential for xenobiotics to induce genetic change at the population level. Work also will be done to study genetic divergence within and among

endemic species occupying unique southeastern ecosystems. (DeVoe, Dwyer, *et al:* R/FT-1)

5.4.1. Apply molecular genetics to better understand fish populations. Focus will be on pelagic, commercially important fishes such as tuna, and rare or threatened species. (Ely, Quattro)

5.4.2. Determine the stock structure of coastal marine fisheries of Southeastern United States through use of advanced molecular genetic techniques. Species of interest will be southern flounder, croaker, and scup. (Chapman)

5.5. Deliver the results of the FISHTEC research program to potential users in the state, regional, and federal marine and fisheries management community. (Bacon, Dwyer)

5.5.1. Plan a FISHTEC interactive workshop for scientists and fishery managers.
5.5.2. Develop and distribute a related publication that explores research results and applications with relevance to management issues. (Dwyer, Bacon)

5.6. Provide the public with information concerning advances in biotechnology that will affect them by writing one feature article for *Coastal Heritage* magazine. (Tibbetts)

5.7. Work with principal investigator László Márton on project R/MT-4*, (Remediation of haloorganic pollutants with Spartina alterniflora)*. The Project will be briefly described in the research section of S.C. Sea Grant's Web site; one news or feature article will be written and sent to appropriate outlets on the results of the project. (Tibbetts)

5.8. Work with principal investigator Joseph Quattro on project R/MT-5*, (Marine evolutionary ecotoxicology-using genomic and population genetic theory to infer the impact of contaminants on natural populations)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site; one news or feature article will be written and sent to appropriate outlets on the results of the project. (Tibbetts)

Goal 6: Enhance the development of viable and sustainable aquaculture and fisheries in South Carolina and the region.

6.1. In the area of resource conservation, a multi-disciplinary team approach will address restoration of declining recreational fisheries. Red drum, *Sciaenops ocellatus,* is South Carolina's most popular coastal recreational fishery, but is in severe decline, and consequently, an appropriate candidate for stock enhancement as a fishery management tool. Various methods will be researched to improve the culture of red drum broodstock and track the release of nearly half a million of the sport fish annually to determine the effectiveness of the overall stocking program in juvenile habitats. (Smith: R/SE-1)

6.2. Development of the shrimp aquaculture industry in the United States, and its competitiveness on an international level, has been slowed by various impediments. One of those is the issue of water exchange. A research team will examine future expansion and development of the U.S. commercial shrimp farming industry from the application of zero exchange, biosecure, super-intensive shrimp production systems. The goal of the research is to devise filtration systems that will be effective in the removal of carbon and nitrogen from the system. This will allow greater loading on the system, which in turn will permit increased stocking densities. (Browdy: R/A-33)

6.3. In concert with Clemson University Extension, the S.C. Shrimpers Association, the S.C. Seafood Alliance, S.C. DNR-Marine Resources Division, and other organizations, work to generate a strategic plan for the long-term health of the South Carolina shrimping industry. (Bacon, DeVoe)

6.4. Continue working with the Atlantic States Marine Fisheries Commission task group in the formulation of aquaculture policy for all Atlantic states. (Whetstone)

6.5. Complete a policy paper on User Conflicts and Water Allocation. (Whetstone)

6.6. Continue to work with the South Carolina Department of Natural Resources and the South Carolina Shellfish Association to expand the capabilities and increase the involvement of the industry in the policy and regulatory process. (Whetstone)

6.7. Assist the South Carolina Shrimp Growers Association in understanding and complying with EPA discharge regulations for aquaculture. (Whetstone)

6.8. Assist in the compilation of information on the economic feasibility of shrimp farming since EPA will develop treatment recommendations according to the ability of the particular industry to afford such treatment. (Whetstone)

6.9. Continue to chair the economic section for the Joint Subcommittee on Aquaculture Effluents Taskforce Shrimp Group. (Whetstone)

6.10. Continue to work with the Joint Subcommittee on Aquaculture and co-chair, with Granvil Treece with Texas Sea Grant, the Marine Shrimp Aquaculture Effluents Committee. The program through EPA continues to look at re-regulation of shrimp aquaculture effluents and the issues of non-native species escapements and diseases. As a co-chair of the committee, the next major effort will be the formation of SBREFA (Small Business Regulatory Enforcement and Fairness Act) Panel to examine the effects of regulation on small business. (Whetstone)

6.11. Serve as a member of the South Atlantic Sea Grant Regional Fisheries Extension Initiative steering committee with other South Atlantic Sea Grant Extension Program leaders. (Bacon)

6.12. Work with principal investigator Theodore Smith on project R/SE-1*, (Impacts of stocked red drum on the recreational fishery and local community economic impact considerations)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site; one news or feature article will be written and sent to appropriate outlets on the results of the project. (Tibbetts)

6.13. Work with principal investigator Craig Browdy on project R/A-33*, (Application of emerging marine water treatment technologies for use in zero exchange biosecure super-intensive shrimp production systems)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site; one news or feature article will be written and sent to appropriate outlets on the results of the project. (Tibbetts)

Goal 7: Develop and implement activities to assist coastal communities and small businesses with growth management and sustainable economic development strategies.

7.1. The overall goal of The South Atlantic Bight Land Use - Coastal Ecosystem Study (LU-CES) is to establish a functional understanding of the environmental and socioeconomic trends that characterize the southeastern U.S. coastal region, and to fill critical information gaps that currently limit the identification of links between population and development trends and their effects on the region's ecosystems. The end goal is the refinement of tools to predict impacts, build conceptual models of linkages between habitats and ecosystems, and define the spatial scale at which management will have the highest probability of minimizing or avoiding impacts. Fieldwork will be done in the Okatie River system. To best achieve its goals, LU-CES will organize around the following five teams: Physical Attributes and Hydrology; Geochemistry and Nutrients; Toxic Contaminants and Ecological Effects; Land Use; and Database Management/GIS Modeling/Land Use. A LU-CES web site will be developed and utilized as a means for LU-CES investigators to coordinate field activity and share data. The site may be accessed at: **www.lu-ces.org**. (DeVoe *et al:* R/COP-7)

7.1.1 Develop a 3-D finite-volume hydrodynamic model of the physical oceanographic aspects of the Okatee complex; measure the hypsometric curve of the Okatee; and establish water quality monitoring stations. (Blanton *et al.*)

7.1.2 Develop a quantitative understanding of trends in water quality, estuarine metabolism, and patterns of nutrient exchange in the study area. (McKellar *et al.*)

7.1.3 Assess the ecotoxicological risks of land-based pollution sources that may discharge as non-point source runoff into the estuarine tidal creeks of the Okatee system. (Lee *et al.*)

7.1.4 Develop a Web-enhanced, GIS-based database management and information dissemination program, as well as an integrated surface and groundwater model of fecal coliform bacteria and nutrients associated with land uses adjacent to estuaries in the study area. Apply models to management needs such as: improvement of understanding of land-use patterns; prediction of impacts of stressors associated with various land uses. (Porter *et al.*)

7.2. Sustainable economic development is a major goal of the Consortium. Its “Coastal Growth Initiative” will seek to (1) develop a coordinated approach to outreach education related to coastal land use impacts on natural resources; (2) establish a support framework to enhance the SC NEMO program; (3) develop outreach education programs to offer advice and assistance to coastal communities in developing comprehensive land use plans consistent with environmental health and resource conservation; and (4) enhance delivery of information developed through Sea Grant land use research programs, such as LU-CES. (DeVoe, Turner: A/CG-1)

7.3. Continue working with the Land Use – Coastal Ecosystem Study (LU-CES) project team to develop outreach/education implementation strategies to assist with the dissemination for the LU-CES research information and products to state agency personnel, municipal officials, planners, the development community and general public. (Turner)

7.4. Work with SCDHEC-OCRM staff to collect and analyze all local government comprehensive land use plans in the eight (8) coastal county region to assess local assistance needs in land-use planning. (Turner)

7.5. Continuing serving on OCRM's Sustainable Coastal Communities Initiative Advisory Committee, to monitor funded stormwater management, wetland restoration, and greenway projects. (Turner)

7.6. Serve on the Sustainable Economic Resources Action Committee to address growth and development strategies for the Sewee to Santee Economic Development Initiative to provide concrete action steps to help Awendaw, McClellanville, and the surrounding rural areas strengthen economies, protect the environment and meet community needs. (Turner)

7.7. Continue work with the Ashley Scenic River Advisory Committee on the education/outreach components (framework and strategies) of the Ashley River Management Plan. (Turner)

7.8. Serve on the Environmental Cost Analysis and Smart Growth Index sub-committee of the Committee on Growth Options Partnering coordinated by the B-C-D COG. (Turner)

7.9. Continue serving as an advisor to the Board of the SC Nature-Based Tourism Association. (Bacon)

7.10. Include Web links to sustainable economic development topics such as aquaculture, nature-based tourism, and related conferences. (Snow, Bacon)

7.11. Assist the Sea Grant Extension coastal recreation and tourism specialist with workshops by providing one news release and one workshop publication. (Blackwell, Ferris)

7.12. Write and distribute one press release about the LU-CES program. (Ferris)

EDUCATION AND HUMAN RESOURCES

Goal 8: Design and implement educational programs that foster a more scientifically and environmentally informed citizenry.

8.1. The COASTeam marine education program will train South Carolina elementary teachers in standards-based multi-disciplinary science. Objectives are to: (1) develop and implement a marine and aquatic science education curriculum specifically aligned to the Science Curriculum Standards at each elementary grade level; (2) involve many teachers at each grade level within each participating school; and (3) target elementary teachers at schools with high percentages of at-risk youth. "Aquatic Workshops" will serve as the basic tool for accomplishing the goals of this marine education project. **http://www.cofc.edu/oceanica**. (Sautter: E/O-16)

8.2. Prepare and submit a proposal to the National Science Foundation in response to its RFP seeking to establish a network of regional "Centers of Ocean Sciences Education Excellence" and, if funded, establish the regional center (DeVoe, Knight, external partners)

8.3. Support the participation of 15 elementary and middle school students in the 4-H Marine Science summer camping program. (Bacon, Core Group)

8.4. Serve as state co-coordinator for Beach Sweep/River Sweep while continuing to emphasize the educational aspects of the program. Sign up 90 coastal site captains for the 2003 Sweep, write and distribute three press releases, and tabulate the number of volunteers and pounds of litter. (Ferris)

8.5. Work with principal investigator Leslie Sautter on project E/O-16, *(COASTeam aquatic workshops – a school-wide approach to integrating marine and aquatic concepts into the K-5 science curriculum)*. The project will be briefly described in the research section of S.C. Sea Grant's Web site and will also be featured in the site's education section. One news or feature article will be written and sent to appropriate outlets on the results of the project; we will continue to link to the COASTeam Web page. (Blackwell, Ferris, Snow)

8.6. Based on the success (as measured by our biennial survey and purge) of the *Coastal Heritage* magazine, we plan to continue building on that success, and at the same time build visibility for the Consortium. (Tibbetts, Snow)

8.6.1. *Coastal Heritage* will be produced four times a year.
8.6.2. Requests for *Coastal Heritage* will be monitored.
8.6.3. The magazine will be submitted to two award competitions.

8.7. Educational curricula for middle and high school teachers ("Coastal Heritage Curriculum Connection") based on *Coastal Heritage* topics will continue to be

developed and distributed to middle and high schools with each issue of *Coastal Heritage*. (Jolly-Clair)

8.8. *Inside Sea Grant,* the internal newsletter of the S.C. Sea Grant Consortium was developed to maintain information flow between the Consortium and its key constituents. Communications will continue to publish this newsletter twice yearly. (Blackwell, Tibbetts)

8.9. Promote S.C. Sea Grant's programs, products, and services by writing and distributing 15 press releases and manning a display for two festivals in 2003. (Ferris)

8.10. Promote S.C. Sea Grant's programs and services by working with at least three other state agencies and NGOs. (Ferris)

8.11. South Carolina's communications program and leadership is committed to a strong national program. Communications will provide both leadership and supporting roles as the network addresses this important issue in light of the current Sea Grant reauthorization process. (Blackwell, Snow)

8.11.1. Serve as chair of the National Publications Task Force. (Blackwell)
8.11.2. Serve as a member of the National Communicator's Steering Committee. (Blackwell)
8.11.3. Serve as a member of the National Hazards Theme Team. (Blackwell)
8.11.4. Serve as a member of the National Media Relations Advisory Committee. (Blackwell)
8.11.5. Serve as a member of the National Sea Grant Web Group. (Snow)

8.12. Continue to support the Sea Grant national media project by responding to ProfNet inquiries whenever possible, distributing two national press releases locally, and attending two meetings, either in person or by conference call. (Blackwell)

8.13. Serve as co-PI on the National Media Relations Project. (Blackwell)

8.14. Support SouthEast Center for Ocean Sciences Education Excellence (SouthEast COSEE). (Blackwell, Snow)

8.14.1. Write and distribute one press release and one feature article. (Ferris)
8.14.2. Design SouthEast COSEE program logo. (Blackwell)
8.14.3. Design and produce SouthEast COSEE promotional materials such as letterheads, envelopes, business cards, notebook covers, and hats. (Blackwell)

Goal 9: Promote the development of a diverse and technically trained workforce.

9.1. An important goal of the South Carolina Sea Grant program is to stimulate interest of minority students in careers in marine and related sciences. The Strategic Partnership to Enhance Experiential Learning in Marine Sciences will develop internships, mentored by scientists from the SCDNR, the Oakridge National Laboratories, and an Orangeburg (S.C.) fish hatchery, to promote such interest. An Executive Council with overview responsibilities will be established for the project. A public awareness and outreach plan will be implemented to recruit minority students to undergraduate and graduate programs in marine science. (Anadu: R/MS-1)

9.2. Engage undergraduate and graduate student interns to assist SCSGC staff and SCSGEP specialists with applied research, education, communications, and extension projects. (Bacon, Whetstone, Sawyer, Turner, Judge, Jolly-Clair, Blackwell, Ferris)

9.3. Through funding of research projects, provide research assistantship opportunities as well as internships for graduate and undergraduate students. Support twenty (20) such students during 2003. (Dwyer)

9.4. Solicit minimum of four applications for the Dean John A. Knauss Marine Policy Fellowship class of 2004 and secure one finalist from South Carolina for a Fellowship in either the executive or legislative branch of government. (Dwyer)

9.5. Solicit minimum of two applications for Coastal Zone Management Fellowships (through the NOAA Coastal Services Center) and place one individual with a state Coastal Zone Management program. (Dwyer)

9.6. Pursue possibilities for providing an Industrial Fellows opportunity through a partnership between the South Carolina Sea Grant Consortium and a private sector company. (Dwyer)

9.7. SCSGC and SCSGEP staff will participate in professional development programs. (DeVoe, Knight, Bacon, Blackwell, Dwyer, Tibbetts, Snow, Ferris, Whetstone, Sawyer, Turner, Judge)